

2006 Remand Trial Transcripts Part 2

1 plaintiffs talked about some here today.

2 First of all, did the L1011 experience the

3 double solution response curve in the same manner as did

4 DELPQP in the APS 3200?

5 A. No.

6 MR. PUTNAM: May I approach, Your Honor?

7 THE COURT: Yes, you may.

8 BY MR. PUTNAM:

9 Q. I am going to hand you PTX-1066. We will display

10 this, but I will give copies to the Court.

11 Can you tell the Court what PTX-1066 is?

12 A. It is titled as a dynamic analysis of the surge

13 control for the L1011 APU.

14 Q. Dated when?

15 A. Dated April 23rd, 1969.

16 Q. From your study of the record, where is April 23rd,

17 1969 with regard to the life cycle or the development

18 history of the L1011?

19 A. The L1011 came into service, I think the first one was

20 1970 that I have been able to find, that was actually in

21 service prior to that, of course, and actually went into

22 flight testing many years before then. So 1965 falls right

23 into the period when the L1011 was being flown.

24 Q. I think you misspoke. You said 1965 falls into the

25 period?

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1 A. 1969, I am sorry.

2 Q. And the title of this or the subject of this document

3 is what, sir?

4 A. Dynamic analysis of the surge control for the L1011

5 APU.

6 Q. If you turn a couple pages in to SUND6011.

7 Let's not blow it up yet.

8 Let's highlight the top right-hand corner.

9 What do you understand this to be, Mr. Muller?

10 A. Yes.

11 Q. What do you understand 6011 to be, sir?

12 A. What it is, it is a block diagram of the L1011 APU

13 surge control.

14 Q. And is there any information on this page regarding

15 the flow parameter and the flow curve for the L1011 surge

16 control system?

17 A. Yes. The flow parameter is indicated in a curve in

18 the lower left-hand corner, which is indicated as Figure 87,

19 or refers to Figure 87.

20 Q. Where Mr. Schlaifer has a little icon?

21 A. Just that block right there, right there.

22 Q. And how do you know that is the flow-related parameter

23 in the L1011 surge control system?

24 A. Because what it's showing is delta P over P.

25 Q. On the left-hand side.

1 A. On the left-hand side, on the Y axis it shows delta P

2 over P. On the X axis, it is hard to read. But what it is,

3 it is a value of W, which is what you normally refer to as

4 the flow rate, times a value which is -- you can't make it

5 out but I know what it is because these are reported for the

6 corrected flow, it is the measured flow times theta, which

7 is a correcting factor, divided by a value referred to as

8 delta.

9 Q. So is that a depiction of delta P over P compared to

10 corrected flow or versus corrected flow for the L1011?

11 A. That's correct.

12 Q. Is that curve a constant curve or a double value

13 curve?

14 A. This is the kind of curve, this proportional curve

15 starting from the lower left-hand corner going to the right

16 that goes up in a proportional manner where, as the value of

17 delta P over P changes, what you actually measure when you

18 read over to the right and you strike that curve and look

19 down, you get a unique measurement of flow for every

20 measurement of delta P over P, you get a unique measurement

21 of flow as it increases or decreases.

22 Q. And at the top, does that say Figure A-7?

23 A. I believe so, yes.

24 Q. Is there another page later in this document that is,

25 in fact, Figure A-7?

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1 A. The last page.

2 Q. So if we flip to SUND6029. Maybe we can turn it

3 sideways.

4 Mr. Muller, first of all, if you can, look back,

5 because this is not a great copy, it is the best copy the

6 parties have, if you look back to the previous page, 6028 --

7 let's put that up -- do you see in the upper right quadrant

8 the reference to Figure A-6 there?

9 A. Yes.

10 Q. If you look back at the previous page before that, you

11 see the reference to Figure A-5 in the same place?

12 A. Yes.

13 Q. If you go to 6029, we flip it around, in the upper

14 right-hand, if we can highlight the upper right-hand

15 quadrant, blow it up, first of all, is it your understanding

16 that the writing on the lower portion of the blowup says

17 Figure A-7, it is just not a great copy of it?

18 A. That's right.

19 Q. What is the title of Figure A-7?

20 A. It appears to be delta P over P versus corrected flow

21 for diffuser of load compressor.

22 Q. Now, if we expand out to the whole document.

23 What is the curve there? Does that relate to

24 the curve we saw sort of in miniature in the earlier

25 diagram?

1 A. What this is obviously a proper curve, an actual
2 curve citing measurement, where on the Y axis it is showing
3 the difference between, the difference between two
4 pressures, two separate pressures divided by one of them to
5 provide this range of values that goes from zero to .4 on
6 the Y axis, and on the X axis, it shows this value of W,
7 which is in nomenclature in this field, is associated with
8 flow, times a value which is called the square root of that,
9 which is just to the right of that W value.

10 The term that it is a means of correcting the
11 measured flow for the actual temperature compared to a
12 standard temperature, dividing by a value delta. And that
13 delta compares the measurement, or corrects the measurement
14 from the altitude at which it is actually measured to some
15 standard altitude.

16 By that, you end up with a corrected flow.

17 Q. Would a simpler way to say that, this is delta P
18 compared to corrected flow for the L1011?

19 A. But I am an engineer. So I have to describe what it
20 is.

21 Q. Thank you, Mr. Muller.

22 Let's put that slide down.

23 In addition to this question of the nature of
24 the flow curve, did you find in your review other
25 differences or similarities between the L1011 surge control

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1 system and the APS 3200 surge control system?

2 A. I found other differences.

3 Q. If we can turn to Slide No. 12, please. Now, is this
4 the slide you put together summarizing your findings in that
5 regard?

6 MR. LEVINE: Your Honor, I object as leading.
7 He is putting up a slide and going through the --

8 THE COURT: It is leading.

9 MR. LEVINE: If it works both ways...

10 THE COURT: All right.

11 MR. PUTNAM: I am trying to move forward. The
12 predicate is he put the slide together.

13 MR. LIND: It is okay to be leading as long as
14 you work it out in advance.

15 THE COURT: Yes.

16 BY MR. PUTNAM:

17 Q. The first bullet refers to a shock switch. Is that
18 correct?

19 A. That's correct.

20 Q. What is your understanding of the shock switch in the
21 L1011?

22 A. Well, if you keep that thought in mind, a switch as it
23 indicates in the normal term means something that is on or
24 off. It's not a control, it's not the control, it doesn't
25 vary anything. It is a switch. It turns it on and off.

1 The shock portion there is based on a

2 possibility that the standard had, the concern they had that
3 in the event that there were to be a shock, that they did
4 not want a shock or supersonic flow to pass through the
5 system.

6 So if it sensed any indication that there was
7 even a suggestion that a supersonic flow could occur at all,
8 it immediately disabled the surge control. And did that
9 very simply by simply removing all the air that could
10 control the valve. It just dumped it all out to the
11 atmosphere.

12 So the switch just basically opened up, suddenly
13 opened up and dumped out all the air for the surge control
14 valve.

15 Q. Is that comparable or not to the way the APS 3200
16 surge control system operates?

17 A. No. The APS 3200, the value of the DELPQP, the actual
18 measurement that was made was continually generating --
19 finally responding to some supersonic flow condition. And
20 that flow change was going back and forth, was going and
21 operating continuously and still does, apparently. In the
22 case of the L1011 they wanted to prevent that possibility
23 from even occurring.

24 Q. The second bullet on the chart is pneumatic electronic
25 control.

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1 What does that mean?

2 A. The pneumatic control system is an older system. It
3 is based, basically, on the use of valves and levers which
4 are moved by variations in pressure alone. There is no
5 electrical component at all. It is purely the movement of
6 levers and pistons as a result of variations in pressure.

7 Whereas the electronic control is what is used on the 3200.

8 Q. The pneumatic control is used on the L1011?

9 A. The pneumatic control is used on the L1011, yes.

10 Q. What do you mean by that the third bullet, DELPQP
11 response does not occur --

12 A. The response of the DELPQP response, the one I
13 mentioned earlier, where it halfway through the flow peaks
14 up and back down, as the flow continues to increase, it is
15 referred to the inverted-V response, that sort of response
16 is nowhere evident on this APU.

17 Q. Now, the L1011, I think Mr. Levine said in his opening
18 that it measures static pressure, he said four places, four
19 ports in the diffuser. Is that the same place that the APS
20 3200 measures static pressure?

21 A. No.

22 Q. What is the diffuser?

23 A. Well, it is two different diffusers. First of all,
24 the diffuser, on this diffuser using the L1011 referred to
25 as a conical diffuser, which is basically something shaped

00:55:48 1 like a megaphone, a small end going to a large end, there
00:55:48 2 are a series of measurements along the sides of those walls
00:55:48 3 which are used for static pressure measurements.
00:55:48 4 Q. Are all of the static pressure measurements in the
00:55:48 5 L1011 in the diffuser?
00:55:48 6 A. They are all in the diffuser.
00:55:48 7 Q. How about in the 3200?
00:55:48 8 A. In the 3200, there are two measurements made. One, as
00:55:48 9 I have indicated earlier, is in the diffuser. The other is
00:55:48 10 outside of the diffuser in the discharge of the compressor.
00:55:48 11 Q. And so in the L1011, when you do a comparison between
00:55:48 12 the two pressures, where are those two pressures being
00:55:48 13 measured?
00:55:48 14 A. In the L1011, all the pressures are being measured
00:55:48 15 within the diffuser itself.
00:55:48 16 Q. How about in the APS 3200?
00:55:48 17 A. There is only one pressure measurement made in the
00:55:48 18 diffuser. The other is in the outlet of the machine.
00:55:48 19 Q. Let me turn to this last bullet then, which is the
00:55:48 20 inlet guide vane position.
00:55:48 21 Does the L1011 measure the inlet guide vane
00:55:48 22 position as part of its surge control system?
00:55:48 23 A. No.
00:55:48 24 Q. Does the L1011 measure the inlet guide vane position
00:55:48 25 as part of its shock switch option?

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00:55:48 1 A. No.
00:55:48 2 Q. Now, let me ask you if you saw from your review of the
00:55:48 3 record materials whether Sundstrand made any changes to the
00:55:48 4 L1011 surge control system over time?
00:55:48 5 A. Yes, they did.
00:55:48 6 Q. What was that?
00:55:48 7 A. In 1980, they abandoned this measurement that we have
00:55:48 8 just discussed, this measurement of measuring static
00:55:48 9 pressures in the conical -- in the wall of the conical
00:55:48 10 diffuser for the purpose of surge control. They abandoned
00:55:48 11 that system and went to a conventional reflow, flow
00:55:48 12 measurement device.
00:55:48 13 Q. Were there actual L1011 APUs produced with the
00:55:48 14 modified surge control system?
00:55:48 15 A. Yes.
00:55:48 16 Q. And did those relate to a particular line or brand of
00:55:48 17 the L1011?
00:55:48 18 A. Yes. It was a modification made to the L1011 -- the
00:55:48 19 APU was modified to address a basic upgrade in engines used
00:55:48 20 on the L1011.
00:55:48 21 Q. How does that relate to this issue of how the surge
00:55:48 22 control works?
00:55:48 23 A. Well, it relates to the fact, as I indicated earlier,
00:55:48 24 when the question came up, why would you have wanted --
00:55:48 25 would an engineer who was aware of the art at the time, if

00:55:48 1 they were looking ahead to what kind of flow measurement
00:55:48 2 device would they want, or would they consider, what would
00:55:48 3 they consider. Well, if they looked at the prior art, there
00:55:48 4 was no other prior art. And what prior art there might have
00:55:48 5 been, if one were to look at the L1011, where a method of
00:55:48 6 measuring in the -- of measuring flow based solely on static
00:55:48 7 pressure measurements in the wall, if they had considered
00:55:48 8 that, they would have seen, since that in 1980 that method
00:55:48 9 had been abandoned, and they had resorted to the use of a
00:55:48 10 venturi device, which you can buy off the shelf.
00:55:48 11 So if I were the engineer at that time, I don't
00:55:48 12 think I would have looked at an abandoned system that didn't
00:55:48 13 work well. And I would have gone to the same place that
00:55:48 14 they bought the venturi flow meter and used that one.
00:55:48 15 MR. PUTNAM: Thank you, Your Honor, that is all
00:55:48 16 I have at this time.
00:55:48 17 MR. KIRK: Your Honor, in another case which I
00:55:48 18 am involved, Judge Poppiti was appointed special master last
00:55:48 19 week. Late yesterday he scheduled a teleconference at 3:00
00:55:48 20 today that I would be expected to attend. May I ask for
00:55:48 21 Hamilton Sundstrand to be relieved temporarily of its local
00:55:48 22 counsel obligation at 3?
00:55:48 23 THE COURT: All right.
00:55:48 24 MR. KIRK: Thank you, Your Honor.
00:55:48 25 MR. LEVINE: We will behave ourselves.

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00:55:48 1 THE COURT: He will keep you in line.
00:55:48 2 CROSS-EXAMINATION
00:55:48 3 BY MR. LEVINE:
00:55:48 4 Q. Good afternoon, Mr. Muller.
00:55:48 5 A. Good afternoon, Mr. Levine.
00:55:48 6 Q. I want to talk a little bit about your expertise in
00:55:48 7 diffusers and compressors. I want to talk about it compared
00:55:48 8 to Dr. Japikse, Dr. David Japikse. You know Dr. Japikse is
00:55:48 9 the technical expert for Hamilton Sundstrand in this
00:55:48 10 proceeding. Correct?
00:55:48 11 A. That's the way he has been introduced, yes.
00:55:48 12 Q. And you believe that you have a better understanding
00:55:48 13 than Dr. Japikse of what a diffuser's function truly is.
00:55:48 14 Correct?
00:55:48 15 A. I believe I understand what the function of a diffuser
00:55:48 16 is, yes.
00:55:48 17 Q. And you believe you have a better understanding than
00:55:48 18 Dr. Japikse of what a diffuser's function really is. Right?
00:55:48 19 A. My understanding of the diffuser is I think a clear
00:55:48 20 understanding of what a diffuser is. I don't clearly
00:55:48 21 understand what your question is.
00:55:48 22 Q. I understand that. But you think your understanding
00:55:48 23 of what a diffuser is better than Dr. Japikse's
00:55:48 24 understanding. Correct?
00:55:48 25 A. My understanding of diffusers is based on the

1 IN THE UNITED STATES DISTRICT COURT
2 IN AND FOR THE DISTRICT OF DELAWARE

3
4 HONEYWELL INTERNATIONAL INC. : Civil Action
5 and HONEYWELL INTELLECTUAL :
6 PROPERTIES INC., :

7 Plaintiffs, :

8 v. :

9 HAMILTON SUNSTRAND
10 CORPORATION, :

11 Defendant. :

No. 03-1153-GMS

12 Wilmington, Delaware
13 Friday, March 24, 2006
14 8:15 a.m.

15 BEFORE: HONORABLE GREGORY M. SLEET, U.S.D.C.J., and a Jury

16 APPEARANCES:

17 THOMAS C. GRIMM, ESQ.
18 Morris, Nichols, Arsht & Tunnell
19 -and-
20 ROBERT KRUPKA, ESQ.,
21 JONATHAN F. PUTNAM, ESQ., and
22 LEE ANN STEVENSON, ESQ.
23 Kirkland & Ellis
24 (New York, New York)

25 Counsel for Plaintiffs

SECOND DAY OF TRIAL

00:38:29 1 as follows ...)

00:38:31 2 DIRECT EXAMINATION CONTINUED

00:38:33 3 BY MR. LEVINE:

00:38:34 4 Q. Good morning.

00:38:37 5 A. Good morning.

00:38:38 6 Q. Where we were yesterday before we broke, we had just

00:38:42 7 been through the different parts of the load compressor and

00:38:48 8 we had just talked about the different kinds of pressure.

00:38:51 9 With that background, I want to now turn to some specific

00:38:59 10 issues relating to the use of IGV position and the effect on

00:39:03 11 flow.

00:39:04 12 I have up near you a board marked as HSC

00:39:09 13 Demonstrative Exhibit 3. It lays out Sundstrand's position

00:39:15 14 on what the equivalent is.

00:39:19 15 What happened in the trial is a legal issue,

00:39:20 16 that is not something for this witness.

00:39:22 17 I want to point you to this language here where

00:39:25 18 it says this Court, where it says the flow-related parameter

00:39:28 19 used by the APS 3200 DELPQP was a direct function of inlet

00:39:35 20 guide vane position.

00:39:36 21 In your opinion, was having a flow-related

00:39:39 22 parameter that was a direct function of IGV position

00:39:43 23 foreseeable in 1982 to a person of ordinary skill in the

00:39:46 24 art?

00:39:47 25 A. Yes.

1 APPEARANCES CONTINUED:

2 RICHARD D. KIRK, ESQ.

3 The Bayard Firm

4 -and-

5 MARK L. LEVINE, ESQ.,

6 CHRIS J. LIND, ESQ., and

7 BRIAN SWANSON, ESQ.

8 Bartlit Beck Herman Palenchar & Scott LLP

9 (Chicago, Illinois)

10 -and-

11 DAVID HERRINGTON, ESQ.

12 Cleary Gottlieb

13 Counsel for Defendant

14 THE COURT: Good morning.

15 Please be seated.

16 (Counsel respond "Good morning.")

17 THE COURT: Mr. Levine, you may resume your
18 examination of the Doctor. Is he here?

19 MR. LEVINE: While he is getting set up, I have
20 a set of remaining demonstratives that he may be referring
21 to during his testimony. I hand them to the Court. I also
22 have for convenience a set of binders of documents we may be
23 referring to. I hand that to the witness, the Court and the
24 other side.

25 (... DAVID JAPIKSE, having been previously
sworn as a witness, was examined and testified further

00:39:47 1 MR. KRUPKA: Objection, Your Honor. This is not

00:39:50 2 the equivalent that the witness testified to or put in his

00:39:53 3 report.

00:39:54 4 THE COURT: Okay. Can we clear this up, Mr.

00:39:57 5 Levine?

00:39:58 6 MR. LEVINE: Your Honor, let me get a copy of

00:40:02 7 the report.

00:40:04 8 MR. PUTNAM: I have copies of the report if the

00:40:06 9 Court wants them.

00:40:07 10 THE COURT: If you have an agreement, the Court

00:40:09 11 may not need it. At some point the Court is going to get

00:40:13 12 it.

00:40:16 13 MR. LEVINE: Pages 8 to 10 and 13 to 17.

00:40:21 14 MR. PUTNAM: I am handing the Court binders with

00:40:23 15 his two reports and a deposition as well, for what it's

00:40:27 16 worth.

00:40:27 17 THE COURT: Mr. Levine, so you are paying

00:40:30 18 attention, I have been handed your witness reports by your

00:40:35 19 opponents.

00:40:35 20 MR. LEVINE: Okay. If you look at Page 9 of his

00:40:44 21 report? This is the report of 1/27/06?

00:40:56 22 THE COURT: Okay.

00:40:56 23 MR. LEVINE: It is called expert report of David

00:40:59 24 Japikse.

00:41:02 25 THE COURT: Okay.

00:59:26 1 parameters and the surge set point were a function of inlet
 00:59:31 2 guide vane position. Correct?
 00:59:31 3 That's -- I believe that's correct.
 00:59:37 4 What conclusions did you draw from this
 00:59:38 5 testimony, if any?
 00:59:38 6 A. Well, I found it was consistent and didn't change my
 00:59:41 7 views. It was consistent with what I found in the art.
 00:59:45 8 Q. Yesterday, Mr. Muller testified on Pages 668 through
 00:59:52 9 669 of the transcript as follows. Actually, I am sorry, I
 01:00:01 10 have it wrong.
 01:00:02 11 I am going to take you to trial testimony from the
 01:00:09 12 trial. This is just as reference. Pages 668 to Page 669 of
 01:00:17 13 the trial.
 01:00:55 14 At trial, Mr. Muller answered a question talking
 01:00:58 15 about -- this is the trial in 2001. Mr. Muller answered a
 01:01:03 16 question, The function in the APS 3200, and he is talking
 01:01:08 17 about the surge control system and how it uses IGV position,
 01:01:13 18 and he says it tells when it is operating in high flow and
 01:01:18 19 when it is operating in low flow.
 01:01:19 20 Can IGV position tell you whether you are
 01:01:23 21 operating in high flow or low flow or being input into that?
 01:01:27 22 A. Yes.
 01:01:27 23 Q. Was it known or foreseeable to a person of ordinary
 01:01:31 24 skill in the art in 1982 to use IGV position to determine
 01:01:31 25 whether the flow was high or low?

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01:01:38 1 A. Yes.
 01:01:38 2 Q. I want to now move to the second part of what we
 01:01:43 3 talked about before, we read -- I asked you about the use of
 01:01:50 4 inlet guide vane position into a surge control system by
 01:01:55 5 utilizing a flow-related parameter that is a direct function
 01:01:58 6 of inlet guide vane position.
 01:02:00 7 I now want to talk about that in a little
 01:02:04 8 broader sense, just more generally incorporating the
 01:02:05 9 position of inlet guide vanes into the surge control system.
 01:02:09 10 Is that something that was known in 1982?
 01:02:13 11 A. Yes.
 01:02:14 12 Q. In your opinion, was incorporating the position of
 01:02:19 13 IGVs surge control system to efficiently control surge
 01:02:23 14 foreseeable to a person of ordinary skill in the art in
 01:02:26 15 1982?
 01:02:27 16 A. Yes.
 01:02:27 17 Q. I am going to put up the Glennon reference again,
 01:02:30 18 which is Defendant's Exhibit 327. If we turn to Figure 3 of
 01:02:38 19 that document, there is a portion of that -- first of all,
 01:02:42 20 what is this schematic, generally?
 01:02:46 21 A. It is a general control schematic.
 01:02:48 22 Q. There is a reference to inlet guide vane or speed
 01:02:49 23 information. Do you see that?
 01:02:51 24 A. That's correct.
 01:02:51 25 Q. Now I am going to turn to Figure 5 -- I am sorry,

01:02:57 1 Column 5 of Exhibit 327, at Lines 33 to 37. It says as
 01:03:06 2 follows: A variable speed or a variable geometry compressor
 01:03:11 3 may be employed in lieu of fixed speed fixed geometry
 01:03:15 4 compressor discussed above. In such a situation, the
 01:03:18 5 calculated surge line must be shifted as required for a
 01:03:21 6 given inlet guide vane position or a selected speed. This
 01:03:25 7 may be most easily accomplished by adding a signal
 01:03:28 8 representative of the shift to summer 36 by an inlet guide
 01:03:32 9 vane or speed information circuit 74.
 01:03:36 10 What is this referring to when it talks about
 01:03:38 11 adding a signal representative of this shift by an inlet
 01:03:42 12 guide vane?
 01:03:42 13 A. It's saying that you would use an inlet guide vane
 01:03:46 14 input in a surge control system.
 01:03:52 15 Q. I now want to turn toward how Honeywell has described
 01:04:00 16 the equivalent. I want to focus first on, in a general
 01:04:06 17 sense, delta P over P.
 01:04:13 18 MR. LEVINE: Mr. Lind, you can sit down for now.
 01:04:16 19 BY MR. LEVINE:
 01:04:16 20 Q. Are you familiar with DELPQP?
 01:04:19 21 A. Yes.
 01:04:19 22 Q. What is DELPQP?
 01:04:21 23 A. It is DELP divided by P.
 01:04:23 24 Q. Is it a label in anything?
 01:04:25 25 A. Yes, it is an acronym.

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01:04:26 1 Q. Was the use of delta P over P known in 1982?
 01:04:30 2 A. Yes, it was.
 01:04:31 3 Q. What is the purpose of having the P in the denominator
 01:04:33 4 of delta P over P?
 01:04:35 5 A. Well, the important part is the delta P. If you want
 01:04:38 6 to scale it, you would divide by something. So you can use
 01:04:41 7 a variety of things in the denominator to scale that to a
 01:04:45 8 functional level you might want.
 01:04:46 9 Q. What do you mean by scaling?
 01:04:48 10 A. Reduce it, say, to zero to one, or some other
 01:04:51 11 convenient range of numbers.
 01:04:53 12 Q. Why would someone want to do that?
 01:04:54 13 A. Well, if you wanted to have a signal of just a certain
 01:04:58 14 level, say 0 to 1, then you would divide it down. And also,
 01:05:02 15 if you want to operate over a wide range of conditions with
 01:05:06 16 a large variation, and you can put it on a simpler scale.
 01:05:11 17 Q. Do you see scaling often in aviation applications?
 01:05:14 18 A. Yes, we do.
 01:05:15 19 Q. What?
 01:05:15 20 A. We always use reference conditions. We always refer
 01:05:19 21 things to a particular pressure and a particular
 01:05:22 22 temperature.
 01:05:22 23 Q. Was the measurement of static pressure in the diffuser
 01:05:26 24 known to persons of ordinary skill in the art in 1982?
 01:05:28 25 A. Yes.

01:47:12 1 Q. If you look at Column 1, Lines 40 to 44, there is a
 01:47:18 2 reference to differential existing between pressures acting
 01:47:24 3 on the opposing sides thereof and derived from upstream and
 01:47:29 4 downstream points of the discharge channel of the
 01:47:35 5 compressor.

01:47:39 6 What is this reference to the differential
 01:47:32 7 existing between pressures?

01:47:34 8 A. That's referring to the inlet of a diffuser and
 01:47:38 9 downstream in the volute.

01:47:44 10 Q. I want to turn to the figure of this patent. It is an
 01:47:47 11 early patent, it is only one figure. Can you explain -- I
 01:47:50 12 am putting up something in blue here. What is shown here?

01:47:55 13 A. That is the diffuser for the Figure 1 variation.

01:47:59 14 Q. And what is shown in the red circle?

01:48:02 15 A. That is the blue, just to be complete, under that blue
 01:48:05 16 is an impeller. An impeller, a diffuser and a volute.

01:48:13 17 Q. You said the volute or scroll?

01:48:18 18 A. Yes.

01:48:18 19 Q. What is shown in the green highlights?

01:48:21 20 A. Those are the two pressure taps. They are both wall
 01:48:26 21 flush mounted pressure taps.

01:48:28 22 Q. Where are the pressure taps located in the Loss patent
 01:48:32 23 figure?

01:48:33 24 A. The one is just -- the first one, the first green --
 01:48:38 25 the lower one on the page there is at the diffuser inlet.

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01:48:42 1 And the second green is at the scroll or volute discharge.

01:48:49 2 Q. Now, I will put up a copy of it. What I just put up
 01:48:56 3 with the different colors on the figure of Loss, we are
 01:48:59 4 going to mark as HSC Demonstrative Exhibit No. 15.

01:49:18 5 If you are measuring static pressure at the
 01:49:21 6 diffuser throat, does it affect whether you get the
 01:49:27 7 inverted-V curve whether the second measurement is at the
 01:49:31 8 exit pressure of the scroll as opposed to the exit of the
 01:49:36 9 diffuser?

01:49:36 10 A. No, it does not.

01:49:37 11 Q. Why not?

01:49:39 12 A. Because you just have to have the two pressure taps on
 01:49:46 13 the two sides of the shock, one upstream of the shock and
 01:49:49 14 one downstream. And you will have it either way.

01:49:53 15 Q. Now I want to turn to the L1011. Are you familiar
 01:49:56 16 with the L1011 APU?

01:49:58 17 A. Yes.

01:49:58 18 Q. Who made it?

01:50:07 19 A. That was made by Hamilton Standard.

01:50:16 20 Q. Did you familiarize yourself with the L1011 APU?

01:50:16 21 A. Yes, I did.

01:50:20 22 Q. I am putting up HSC Demonstrative Exhibit No. 338.

01:50:30 23 Can you explain what this shows?

01:50:32 24 A. Yes. This is an exploded view again of the principal
 01:50:36 25 components of the L1011 APU, showing particularly the

01:50:43 1 diffuser, half of the diffuser there in that exploded view.

01:50:48 2 Q. Does this show -- can you just go from right to left
 01:50:51 3 and show what parts of the APU load compressor in the L1011
 01:50:58 4 compressor are shown in HSC demonstrative 338?

01:51:03 5 A. On the right-hand side we have the inlet guide vane
 01:51:06 6 and they are shown in a nearly closed or mostly closed
 01:51:07 7 position. Just to the left of that, the round disk with the
 01:51:10 8 various little plate-like like things on it, that is the
 01:51:14 9 impeller with its various blades.

01:51:16 10 Just to the left is the piece that we now
 01:51:18 11 recognize in the room here, which is one-half of the
 01:51:22 12 diffuser. Those two halves mate together. So what you see
 01:51:26 13 on that surface mates up exactly with the other side at the
 01:51:29 14 interface. And then behind that you have the scroll.

01:51:34 15 Q. Are there measurements of static pressure in the L1011
 01:51:44 16 APU?

01:51:44 17 A. Yes, there are.

01:51:45 18 Q. Where are those measurements?

01:51:47 19 A. There are four in a diffuser passage.

01:51:51 20 Q. Are those the four holes that are shown in Defendant's
 01:51:56 21 Exhibit -- the portion of Defendant's Exhibit 399 that's the
 01:52:00 22 part of the diffuser?

01:52:02 23 A. I can't see them from here.

01:52:04 24 Q. These four little holes here?

01:52:07 25 A. Yes. Those are the pressure taps.

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01:52:09 1 THE COURT: Can you point them out again?

01:52:11 2 MR. LEVINE: Here, here, here and here

01:52:14 3 (indicating).

01:52:16 4 BY MR. LEVINE:

01:52:17 5 Q. Did the L1011 APU surge control system look at a delta
 01:52:24 6 P over P?

01:52:27 7 A. Did the surge control system look at a delta P --

01:52:31 8 Q. Let me ask it differently. Was there a delta P over P
 01:52:35 9 in the L1011 APU?

01:52:38 10 A. Yes, it senses a delta P over P.

01:52:43 11 Q. Was the L1011 APU diffuser subject to the inlet guide
 01:52:50 12 vanes?

01:52:50 13 A. Yes.

01:52:50 14 Q. I am going to put up Exhibit 105, the Master Key
 01:52:56 15 document, in particular 2-12, SUND 4999, it is the third
 01:53:06 16 full paragraph, it talks, if the flow becomes supersonic,
 01:53:11 17 the ventura chamber acts as a divergent duct and there is a
 01:53:17 18 progressive pressure low from PSO to PT.

01:53:20 19 What is that referring to?

01:53:21 20 A. It is referring to the supersonic flow.

01:53:23 21 Q. What happens to the static pressure in the L1011 APU
 01:53:28 22 diffuser when there is supersonic flow?

01:53:29 23 A. Well, you have to trace through that. But you are
 01:53:32 24 going to get a diminishing of the pressure at the exit, so
 01:53:36 25 you end up with the two points on an inverted-V curve.

01:53:41 1 Q. Well, is there a difference between what happens in
 01:53:44 2 the L1011 diffuser when the flow is subsonic compared to
 01:53:49 3 supersonic?
 01:53:51 4 A. It is a different flow state.
 01:53:54 5 Q. When there is subsonic flow, does the pressure go up
 01:53:54 6 or down?
 01:53:54 7 A. The subsonic flow, the pressure is going up, and the
 01:53:58 8 supersonic flow, it is reduced.
 01:54:00 9 Q. I am going to put up now Defendant's Exhibit 108,
 01:54:07 10 which is an October 28th, 1975 memo from Mr. Emmons. If you
 01:54:13 11 look at Page 5 of the document, SUND 677, there is a
 01:54:20 12 reference at the very top, the undesirable tendency of both
 01:54:23 13 the signal curve and the delta P curve to peak and then drop
 01:54:27 14 off thus potentially giving an ambiguous signal.
 01:54:30 15 What do you understand that to refer to?
 01:54:32 16 A. That is an inverted-V curve behavior.
 01:54:35 17 Q. I am now going to put up Defendant's Exhibit 104,
 01:54:41 18 which is a memorandum from Mr. Spadafora dated May 30th,
 01:54:48 19 1975. If we look at the last page of this document, SUND
 01:54:54 20 294, can you tell me what is shown there?
 01:54:57 21 A. Yes. Those are measurements for the flow
 01:55:06 22 characteristic for the L1011, and we are seeing the
 01:55:09 23 inverted-V curve here for this machine. We have a delta P
 01:55:16 24 over P on the left, and a corrected compressor flow on the
 01:55:16 25 bottom.

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01:55:22 1 MR. LEVINE: Mr. Lind...
 01:55:25 2 MR. LIND: Your Honor, duty calls again.
 01:55:27 3 THE COURT: All right, Mr. Lind.
 01:55:29 4 BY MR. LEVINE:
 01:55:29 5 Q. How is it that Hamilton Sundstrand addressed this
 01:55:33 6 inverted-V or double solution issue?
 01:55:36 7 A. They created a device called a shock switch.
 01:55:39 8 Q. What did the shock switch do?
 01:55:41 9 A. It detected supersonic flow.
 01:55:44 10 Q. Now, Mr. Muller made a few different points about the
 01:55:48 11 L1011 during his testimony. First, he said, and this is in
 01:55:55 12 one of the demonstratives put up by Honeywell, that the
 01:55:57 13 shock switch was designed to disable a surge control system
 01:56:01 14 before reaching supersonic flow.
 01:56:04 15 Does the L1011 APU shock switch have any effect
 01:56:07 16 on the surge control system before it reaches supersonic
 01:56:10 17 flow?
 01:56:11 18 A. No, not at all. You have to have supersonic flow.
 01:56:14 19 Q. Even in supersonic flow, does the L1011 APU shock
 01:56:18 20 switch stop the APU from experiencing this flow?
 01:56:21 21 A. No.
 01:56:25 22 Q. What is it that it does?
 01:56:28 23 A. It just tells it to ignore that part of the system,
 01:56:32 24 and keep the valve in position to deliver all the flow to
 01:56:37 25 the system, the aircraft or whatever load they have.

01:56:40 1 Q. So is it saying to ignore what is on the right-hand
 01:56:43 2 side of the curve?
 01:56:44 3 A. Yes, ignore that input.
 01:56:48 4 Q. Is that any different than what is done in the 3200 in
 01:56:51 5 terms of ignoring what is on the right-hand side of the
 01:56:54 6 curve?
 01:56:56 7 A. No. Same process.
 01:56:57 8 Q. Mr. Muller also said yesterday the control was
 01:57:00 9 pneumatic and not electronic. Is that correct, is that
 01:57:04 10 correct, that he said that?
 01:57:05 11 A. Yes, that is basically right.
 01:57:05 12 Q. Is the surge control in the L1011 pneumatic?
 01:57:09 13 A. Yes.
 01:57:09 14 Q. Is that relevant to your opinion on the issues in this
 01:57:12 15 case?
 01:57:12 16 A. No. I am looking at the functionality. That is not
 01:57:15 17 relevant.
 01:57:17 18 Q. Now, Mr. Muller next argued that the DELPQP response
 01:57:21 19 does not occur in the L1011. Can the L1011 experience a
 01:57:25 20 double solution curve?
 01:57:26 21 A. Oh, yes.
 01:57:27 22 Q. And how do you know that?
 01:57:28 23 A. Well, because there is various pieces of evidence of
 01:57:34 24 supersonic flow and there is nothing to keep it from going
 01:57:36 25 over there.

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01:57:37 1 Q. Does Figure 9 of Defendant's Exhibit No. 104 show what
 01:57:44 2 evidence you looked at is?
 01:57:47 3 A. Yes. They have taken the data from one of the
 01:57:49 4 devices, I think, that we have on the right-hand side.
 01:57:52 5 Q. I am now going to skip a couple slides, and go to HSC
 01:57:58 6 Demonstrative Exhibit No. 237. Just to set this up, on the
 01:58:07 7 left-hand side we have Figure 9 from Defendant's Exhibit
 01:58:10 8 104, which we just looked at, double solution/inverted-V
 01:58:14 9 curve. On the right-hand side we have Figure 1 from
 01:58:17 10 Glennon, which is Defendant's Exhibit 327.
 01:58:20 11 And then, the next thing that is shown on HSC
 01:58:26 12 Demonstrative Exhibit No. 238 is -- tell me what is shown
 01:58:31 13 there.
 01:58:31 14 A. It's the same information. We have the inverted-V
 01:58:35 15 curve for the basically L1011, but it is generic here on the
 01:58:40 16 left. And we have the compressor map with various different
 01:58:44 17 IGV positions on the right.
 01:58:46 18 Q. Let's start with the compressor map on the right.
 01:58:49 19 Does the compressor map show the effect of IGV position on
 01:58:53 20 flow?
 01:58:54 21 A. Yes, different lines or different flow levels.
 01:58:57 22 Q. Is there any indication from the IGV position whether
 01:59:00 23 the flow is low or high?
 01:59:02 24 A. Yes. We understood from the previous data cases that
 01:59:08 25 the high IGV angle settings are on the left, and that's

01:59:14 1 highly closed. So we get the low flows. And when you use
 01:59:18 2 the low angle settings, where it is quite open, that's on
 01:59:27 3 the right-hand side where we get the high flow rates.
 01:59:31 4 Q. And now there is some icons that have been added to
 01:59:34 5 HSC Demonstrative Exhibit No. 238. What do those show?
 01:59:37 6 A. It is just a depiction of what I was trying to say.
 01:59:43 7 You have got a wide open IGV on the upper right-hand corner.
 01:59:47 8 You have got a pretty closed, the little Venetian blind
 01:59:50 9 things there are laid over in the lower corner. So it's
 01:59:53 10 mostly closed, just partially open.
 01:59:55 11 Q. Then there i some dashed lines that are drawn. What
 02:00:03 12 do those show?
 02:00:07 13 A. Well, the horizontal one is a, just a constant, equal
 02:00:09 14 pressure line. Just call it an equal pressure line or equal
 02:00:14 15 pressure ratio for the compressor. And you are looking at
 02:00:17 16 two possibilities, a high flow and a low flow. And the high
 02:00:20 17 flow is obviously on the right. It corresponds to an open
 02:00:26 18 guide vane setting. On the left, obviously, it corresponds
 02:00:32 19 to a much more closed guide vane setting.
 02:00:35 20 Q. And if you now look on the left-hand curve, that is
 02:00:38 21 labeled double solution curve on Demonstrative Exhibit No.
 02:00:42 22 238, in 1982, what information would a person of ordinary
 02:00:44 23 skill in the art be looking for in order to determine
 02:00:47 24 whether you are on the left-hand side of the curve or the
 02:00:50 25 right-hand side of the curve?

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02:00:47 1 A. An indicator of high flow or low flow.
 02:00:50 2 Q. How is it that a person of ordinary skill in the art
 02:00:57 3 in 1982 would go about determining whether you are in high
 02:01:02 4 flow or low flow?
 02:01:03 5 A. Well, the most apparent one would be to use inlet
 02:01:06 6 guide vane settings.
 02:01:08 7 Q. How is it that inlet guide vane settings or position
 02:01:11 8 could help in determining whether the flow is low or high?
 02:01:14 9 A. Well, clearly, if you have a guide vane setting and
 02:01:18 10 you check it and see that it's set open, you should be on
 02:01:22 11 the right-hand side. If you check and you see it is quite
 02:01:25 12 closed, you would know you would have to be on the left-hand
 02:01:28 13 side. Especially dealing with the low levels that we are
 02:01:32 14 showing right here.
 02:01:33 15 Q. Is that something you know from the compressor map on
 02:01:35 16 the right?
 02:01:38 17 A. Yes.
 02:01:38 18 Q. And now again, IGV icons are shown on the left graph
 02:01:43 19 now of HSC Demonstrative Exhibit No. 238. What does that
 02:01:46 20 show?
 02:01:53 21 A. Well, we are showing your icons, open guide vanes on
 02:01:55 22 the right and closed down on the left.
 02:01:58 23 Q. And some dashed lines are drawn again. What do those
 02:02:00 24 show?
 02:02:00 25 A. It just repeats what I said: that you would make a

02:02:03 1 distinction, if you wanted to know if you are on the right,
 02:02:06 2 you would check the guide vane that is open, you know you
 02:02:08 3 are on the right. If you checked it, you found out it is
 02:02:12 4 quite closed, you would expect to be and you would be on the
 02:02:14 5 left.
 02:02:14 6 Q. Now, I am going to turn to some testimony yesterday
 02:02:19 7 from Mr. Muller, on Page 135, Lines 10 through 19. He said
 02:02:28 8 on the 3200 that when they were faced with this unexpected
 02:02:31 9 response, what they had to do was to find a way of
 02:02:34 10 discriminating between the low region and the high region,
 02:02:37 11 or the high flow region and the low flow region of the
 02:02:40 12 response.
 02:02:41 13 Was IGV position a way of discriminating between
 02:02:48 14 the low flow region and the high flow region of the double
 02:02:50 15 solution curve in 1982?
 02:02:52 16 A. Yes.
 02:02:53 17 Q. In your opinion, would it have been foreseeable to a
 02:02:56 18 person of ordinary skill in the art in 1982 to use IGV
 02:03:00 19 position to address a double solution issue?
 02:03:02 20 A. Yes.
 02:03:03 21 Q. Are there other ways that could be used to address the
 02:03:14 22 double solution issue?
 02:03:16 23 A. Yes.
 02:03:18 24 Q. Can you give any examples?
 02:03:20 25 A. Yes. If you made any kind of a gauge to check for

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02:03:26 1 supersonic flow directly, that would indicate, such as the
 02:03:30 2 pressure taps in the L1011, that would be an option. You
 02:03:35 3 could use other gauges to answer that, too.
 02:03:36 4 Q. One last thing, and then we will be done. This will
 02:03:39 5 take five minutes or less. Are you familiar with the
 02:03:42 6 Honeywell 331-350 APU?
 02:03:44 7 A. Yes.
 02:03:45 8 Q. And was that developed in the late 1980s?
 02:03:48 9 A. Yes.
 02:03:48 10 Q. Does the Honeywell 331-350 measure static pressure in
 02:03:54 11 the diffuser throat?
 02:03:56 12 A. Yes.
 02:03:57 13 Q. And if we look at Exhibit, Demonstrative Exhibit 210,
 02:04:07 14 which is a Honeywell document from May 4th, 1989, it is a
 02:04:15 15 reference to the selection of static pressure pick-up for
 02:04:18 16 surge control. And then, if we look at the third page of
 02:04:24 17 the document, there is some, there are two curves that are
 02:04:30 18 shown. Are these two curves that are shown for the 331-350
 02:04:34 19 inverted-V or double solution curves?
 02:04:37 20 A. Yes, they are.
 02:04:38 21 Q. How is it that Honeywell addressed the double solution
 02:04:41 22 issue in the 331-350 in the late 1980s?
 02:04:45 23 A. With guide vane position.
 02:04:47 24 Q. Did you look at what Mr. Clark from Honeywell said
 02:04:53 25 about how they addressed the use, how they addressed the

02:22:28 1 whether or not the APS 3200 is the equivalent, an issue this
02:22:33 2 expert didn't look at at all, is completely irrelevant in
02:22:36 3 this proceeding. That is an assumed point for the purposes
02:22:40 4 of this proceeding.

02:22:40 5 THE COURT: Mr. Krupka, where are you going?

02:22:41 6 MR. KRUPKA: Your Honor, I am just trying to
02:22:44 7 determine what opinions he has with respect to the subject
02:22:45 8 matter. It is cross-examination. I want to find out
02:22:48 9 whether that is pertinent to his opinion.

02:22:49 10 THE COURT: It is cross-examination. But there
02:22:51 11 are boundaries, I am trying to be reasonably liberal in the
02:22:56 12 application of the rules, given the setting. But there do
02:23:01 13 need to be some parameters. So what is the purpose of this
02:23:05 14 particular line of inquiry?

02:23:07 15 MR. KRUPKA: To determine, Your Honor, what his
02:23:09 16 opinion is with respect to this as to whether or not this
02:23:11 17 has any impact on the opinions he rendered with respect to
02:23:14 18 foreseeability. If he is of the opinion -- depending on
02:23:18 19 what the opinion is on this subject, that could have an
02:23:23 20 impact on his credibility and the bases for the opinion with
02:23:26 21 respect to --

02:23:27 22 THE COURT: I am going to let you explore this a
02:23:30 23 bit. But let's not get too far afield.

02:23:33 24 MR. KRUPKA: We are not going to go very far,
02:23:36 25 Your Honor.

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02:23:35 1 THE COURT: All right.

02:23:36 2 BY MR. KRUPKA:

02:23:37 3 Q. Mr. Japikse -- excuse me, Dr., let me hand you --

02:23:43 4 MR. KRUPKA: May I approach, Your Honor?

02:23:45 5 THE COURT: Yes.

02:23:45 6 BY MR. KRUPKA:

02:23:46 7 Q. Let me hand you Joint Trial Exhibits 30 and 32, which
02:23:49 8 are the two patents in suit.

02:24:03 9 Looking first at JTX-30, which I think is the

02:24:08 10 '893 patent, if you look at Claim 19, my question is --

02:24:17 11 A. Wait a minute. Claim 19?

02:25:18 12 Q. Yes. The question is, is the APS 3200 an equivalent
02:25:22 13 of what is literally stated in Claim 19?

02:25:25 14 MR. LEVINE: Your Honor, objection. Renewing my
02:25:30 15 objection. May I have a standing objection to this line of
02:25:30 16 questioning, please?

02:25:31 17 THE COURT: Yes. We are going to see where it
02:25:33 18 goes.

02:25:34 19 MR. LEVINE: I just don't want to have to stand
02:25:36 20 up and repeat it.

02:25:41 21 THE COURT: That's right.

02:25:41 22 THE WITNESS: I am not trained in discussions of
02:25:43 23 literal and equivalent. I have not worked on matters what
02:25:47 24 is literal, what is equivalent. I have been looking at
02:25:49 25 technological issues. I can't make a distinction that you

02:25:52 1 are making there.

02:25:53 2 Q. Is it fair then to say you just don't know?

02:25:56 3 A. I can't make that kind of distinction.

02:25:58 4 Q. And is it then fair to say that it wasn't in your
02:26:02 5 opinion pertinent to any of your opinions or testimony in
02:26:05 6 this case?

02:26:08 7 A. Repeat, please?

02:26:09 8 Q. Is it therefore correct that you didn't believe it was
02:26:13 9 either pertinent or relevant to any of the opinions or
02:26:19 10 testimony that you are giving in this case?

02:26:22 11 A. It meaning, referring to this claim?

02:26:25 12 Q. No. Referring to the question of whether the APS 3200
02:26:28 13 is or is not equivalent to either Claim 19 or Claim 8 or
02:26:33 14 Claim 4?

02:26:34 15 A. I think you said literally equivalent before. I did
02:26:36 16 not look at that -- I did not form an opinion.

02:26:39 17 Q. Well, I didn't say literally equivalent. Just so we
02:26:43 18 get this clear. I asked you whether the APS 3200 was
02:26:46 19 equivalent to the literal terms of Claim 19.

02:27:02 20 A. I did not make a detailed review of that structure
02:27:07 21 language.

02:27:08 22 Q. Okay. But is it then correct to say that in your
02:27:12 23 opinion, you didn't think that determination was relevant to
02:27:16 24 either your opinions or your testimony in this case?

02:27:22 25 A. I did not form an opinion on that question or subject.

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02:27:26 1 Q. And you didn't think that it was necessary to do so in
02:27:29 2 order to render the opinions you were asked to give and give
02:27:33 3 the testimony that you have been asked to give in this case?

02:27:36 4 A. I didn't think about it at all. I can't answer one
02:27:39 5 way or the other.

02:27:40 6 Q. Now, looking at Claim 19 again as a representative
02:27:45 7 example of the three claims we have in suit here, did you
02:27:48 8 form an opinion as to whether or not the subject matter of
02:27:53 9 Claim 19 was or was not obvious to somebody of ordinary
02:27:57 10 skill in the art?

02:27:58 11 A. Various parts of these technical questions I looked
02:28:04 12 at, issue by issue on a technological basis in forming
02:28:10 13 opinions as to whether those technologies were foreseeable
02:28:15 14 by people.

02:28:16 15 Q. Now, you have given various testimony in this case
02:28:19 16 today and yesterday. And you rendered several opinions in
02:28:23 17 your expert reports that used the word foreseeable.
02:28:27 18 Correct?

02:28:27 19 A. That's right.

02:28:28 20 Q. What do you understand the word foreseeable to mean?

02:28:31 21 A. Whether a person would be able -- whether a person
02:28:35 22 skilled in the art would be able to foresee that, reasonably
02:28:39 23 foresee that at a time stated.

02:28:42 24 Q. Well, what do you mean by reasonably foresee?

02:28:49 25 A. A person skilled in the art would take that approach.

02:28:53 1 to do the job, to do the work.

02:28:56 2 Q. Is your understanding of foreseeability that it would

02:29:22 3 be readily apparent to the person of ordinary skill in the

02:29:24 4 art to do it the way you say is foreseeable?

02:29:26 5 A. I would say reasonably apparent to the person.

02:29:28 6 Q. But not readily apparent?

02:29:30 7 A. I think the words are very close together. I can't

02:29:34 8 make any particular distinction.

02:29:35 9 Q. You think reasonably apparent and readily apparent are

02:29:38 10 the same?

02:29:41 11 A. It seems to me linguistically, that seems to me to be

02:29:46 12 close to each other.

02:29:48 13 Q. Now, let's talk about what you did to prepare for your

02:30:02 14 testimony and to render your opinions. You had eight or

02:30:11 15 nine of your colleagues at your company working with you to

02:30:15 16 help prepare all this. Right?

02:30:16 17 A. To work on technical documents and technical

02:30:19 18 references for me, to procure them.

02:30:22 19 Q. And after you were hired, you and all these eight or

02:30:26 20 nine people that were working with you went around and

02:30:28 21 looked for all sorts of technical materials to support your

02:30:33 22 opinion. Correct?

02:30:34 23 A. Well, went around is not an appropriate expression.

02:30:38 24 We did a systematic search, starting with materials that I

02:30:40 25 have used in lectures and so forth over the years and just

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02:30:44 1 branched out from there.

02:30:46 2 Q. Indeed, you listed some 80 references in Exhibit B to

02:30:50 3 your report.

02:30:51 4 A. Yes, I believe that's approximately the kind of

02:30:57 5 number.

02:30:57 6 Q. And all of those were cited some place as support for

02:31:01 7 your opinions. Correct?

02:31:05 8 A. I would have to check whether all of those, but

02:31:08 9 substantially. Most of those references you can find in my

02:31:10 10 book. Many of the references you can find in the book and

02:31:13 11 other sources.

02:31:14 12 Q. Well let me ask, because I didn't go through and check

02:31:19 13 it either. I assumed because of the way it was referred,

02:31:21 14 that all of the references listed in Exhibit B to your

02:31:24 15 report were references that you cited someplace in the body

02:31:28 16 of your report. Is that correct? Or don't you know?

02:31:31 17 A. Yes, unless they are typographical errors.

02:31:33 18 Q. Now, when you started your work for Hamilton

02:31:40 19 Sundstrand, is it correct that you knew what opinion they

02:31:46 20 wanted you to reach?

02:31:48 21 A. No, it is not.

02:31:48 22 Q. How did you know what it was that you were being asked

02:31:52 23 to determine was foreseeable or not?

02:31:56 24 A. That evolved over a period of time. The first weeks

02:32:02 25 expanded over about three months, October and November into

3/31/2006 02:04:52 PM

02:32:05 1 December weren't focused on anything in particular. There

02:32:12 2 were general questions asked, how does this work, how does

02:32:14 3 that work. I was just providing general answers.

02:32:17 4 Then in December I started writing what I

02:32:21 5 thought about different questions that were out there. It

02:32:23 6 was very abstract at that point. At that point, I had not

02:32:27 7 been asked to be a witness. There was just general writing

02:32:31 8 on the subject. Look at it, was asked questions. It was

02:32:38 9 very general back-and-forth questions. How does this work,

02:32:40 10 how does that work, and I provided those answers.

02:32:42 11 Q. For example, did anybody tell you what the subject

02:32:45 12 matter was that you were going to be asked to opine on?

02:32:48 13 A. Eventually. But in the period of time that I have

02:32:51 14 just described, I was given various documents to read, and

02:32:55 15 more as the time went along. Initially, I was just talking

02:32:58 16 about Shapiro and what the fluid mechanics was and discussed

02:33:01 17 the general fluid mechanics and how the different things

02:33:04 18 function, how I saw them functioning.

02:33:06 19 Q. By that time had you been exposed to the patents in

02:33:09 20 suit or any of the claims at issue?

02:33:12 21 A. I cannot remember when I first saw the patents. It

02:33:17 22 would be later in the process. I don't think it's in the

02:33:20 23 early weeks or months that I actually had a copy or read it.

02:33:23 24 I think that evolved with time but I can't remember a

02:33:26 25 particular time.

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02:33:26 1 Q. Well, during this time period you were discussing

02:33:28 2 things with Hamilton Sundstrand's counsel. Correct?

02:33:31 3 A. Yes.

02:33:31 4 Q. Now, during this time period, were you asked to go

02:33:34 5 find evidence of this being used in the prior art or that

02:33:39 6 being used in the prior art?

02:33:41 7 A. No. Not in any significant way early on. I was

02:33:45 8 taking references from my diffuser book or my compressor

02:33:48 9 book for early discussion. I just used off-the-shelf stuff

02:33:53 10 for a long time.

02:33:54 11 Q. Doctor, pardon me. I am trying to understand how it

02:33:58 12 was, if you did focus on, for example, surge control

02:34:02 13 systems, inlet guide vanes, double solution curves, things

02:34:07 14 like that, was it just happenstance that you happened to

02:34:10 15 come upon those subjects, or did someone direct you to those

02:34:13 16 topics?

02:34:17 17 MR. LEVINE: Objection, argumentative as far as

02:34:20 18 happenstance.

02:34:20 19 THE COURT: Overruled.

02:34:20 20 THE WITNESS: Could you repeat, please?

02:34:22 21 BY MR. KRUPKA:

02:34:23 22 Q. Yes. My question is, how is it you came to focus on

02:34:27 23 surge control systems, inlet guide vanes, double solution

02:34:31 24 curves, delta P over P?

02:34:34 25 A. Okay. Questions about guide vanes and what they do

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02:34:41 1 were asked from the earliest discussions onward, they asked
02:34:44 2 about it. Questions about how surge works, system surge and
02:34:48 3 so forth, those were asked and discussed generally.

02:34:50 4 The very first meeting occurred when they came
02:34:55 5 out to talk and I was actually lecturing on stall and surge
02:34:58 6 in my compressor class. They sat and listened and just
02:35:02 7 asked more questions. How does this work? How does it go?
02:35:06 8 And they got most of the class under their belt and started
02:35:09 9 asking questions. So we talked back and forth about how it
02:35:12 10 worked, what guide vanes do and so forth.

02:35:15 11 Then it evolved bit by bit as the time went
02:35:19 12 longer as to what the technologies were.

02:35:21 13 Q. Okay. Did there come a time when you were asked to
02:35:24 14 render an opinion as to whether or not the equivalent that
02:35:28 15 was found by the jury to be infringing in this case was or
02:35:32 16 was not foreseeable?

02:35:34 17 A. Eventually I was asked whether various topics were
02:35:37 18 foreseeable.

02:35:38 19 Q. And were you asked about those topics individually or
02:35:42 20 as a combination?

02:35:45 21 A. Well, we certainly did them individually. There were
02:35:48 22 various combinations, yes.

02:35:51 23 Q. And in connection with the combination, did you go and
02:35:56 24 try to find the individual pieces?

02:35:58 25 A. What do you mean, go and find the individual pieces.

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02:36:01 1 Q. Did you seek in prior art references examples of
02:36:07 2 individual elements of the combination that was found to be
02:36:11 3 an infringing equivalent?

02:36:14 4 A. Let me try to answer your question. I am not sure if
02:36:17 5 I quite got it. I think you are asking if I had documents
02:36:21 6 already, that I used those, or whether I went searching for
02:36:25 7 documents to answer pieces. Is that what you asked?
02:36:28 8 Q. Let me rephrase the question, Doctor. I am not
02:36:31 9 communicating with you clearly. I apologize. What I am
02:36:33 10 asking is the other end.

02:36:34 11 In terms of figuring out what subject matters
02:36:38 12 you should seek in the prior art, did you start from the
02:36:43 13 combination that was found to be the infringing equivalent
02:36:48 14 by the jury?

02:36:50 15 A. I don't remember.

02:36:55 16 Q. Now, is it correct that nowhere prior to 1982-1983 did
02:37:01 17 you find any example of the surge control system used in the
02:37:07 18 APS 3200?

02:37:13 19 A. The surge control system, an identical surge control
02:37:16 20 system?

02:37:23 21 Q. The surge control system that is used in the APS 3200.

02:37:25 22 A. Well, I think that means that electronic pieces and
02:37:28 23 everything, no, there is no other identical equivalent,
02:37:30 24 identical copy of that I know of, piece of the circuit and
02:37:34 25 everything in your discussion, I interpret that broadly, if

02:37:39 1 I am getting that right.

02:37:40 2 Q. The closest you came was the surge control system for
02:37:45 3 the L1011. Correct?

02:37:46 4 A. The L1011 shows the principal features, that's
02:37:52 5 correct.

02:37:52 6 Q. And you agree that the closest example that you came
02:37:56 7 up with or any of your eight or nine colleagues who were
02:38:02 8 looking at this for months, the closest you came up with was
02:38:05 9 the surge control system for the L1011?

02:38:09 10 A. I am going to correct a part of that then answer the
02:38:11 11 question. The colleagues were not looking for an equivalent
02:38:14 12 to that machine for months.

02:38:18 13 They were giving me technical information on the
02:38:20 14 various areas when I used them.

02:38:22 15 With that correction, that is correct. That is
02:38:28 16 the understanding.

02:38:28 17 Q. Now, in the preparation of your expert report, you
02:38:36 18 reviewed only brief portions of the trial transcript in the
02:38:40 19 jury trial of this case. Correct?

02:38:42 20 A. Yes.

02:38:43 21 Q. And at your January 27th deposition, you couldn't
02:38:49 22 recall any witness testimony that you read in full.
02:38:52 23 Correct?

02:38:55 24 A. I can't --

02:38:56 25 MR. LEVINE: Your Honor, it is irrelevant what

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02:38:59 1 he could or couldn't recall then. If he wants to impeach,
02:39:01 2 he can ask. He couldn't recall the question.

02:39:03 3 THE COURT: Sustained.

02:39:04 4 BY MR. KRUPKA:

02:39:04 5 Q. Can you recall any witness testimony that you have
02:39:06 6 read in full?

02:39:08 7 A. In full?

02:39:08 8 Q. Yes.

02:39:09 9 A. I can't recall particularly.

02:39:11 10 Q. And what portions of the transcript and deposition
02:39:16 11 testimony that you read was selected for you by Hamilton
02:39:22 12 Sundstrand's counsel. Correct?

02:39:25 13 A. Repeat, please?

02:39:26 14 Q. The portions of the transcript that you read were
02:39:29 15 selected by Hamilton Sundstrand's counsel. Correct?

02:39:32 16 A. I think that's overstating it. Various sections
02:39:36 17 that's correct, read or look at. I think you are going
02:39:41 18 beyond that in your statement.

02:39:50 19 Q. The trial transcript that you read was supplied to you
02:40:06 20 by Hamilton Sundstrand's counsel. Correct?

02:40:08 21 A. I received all of my trial transcripts from the
02:40:42 22 attorneys, yes. That's my only source.

02:40:48 23 Q. And you don't recall if you read either Judge Sleet's
02:40:51 24 opinion in this case or any of the appellate opinions.
02:40:54 25 Correct?